STANDARDS DEVELOPMENT BRANCH O.M.E.
3693600000 4380

TERMS OF REFERENCE FOR EXPERIMENTAL RECLAMATION PLANT

TD
794.5
.T47
1973

Ontario

Ministry of the Environment

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact Service Ontario Publications at copyright@ontario.ca

RESOURCE RECOVERY CENTRE

STAGE I

EXPERIMENTAL RECLAMATION PLANT

Terms of Reference
For
Research Development and Preliminary Design Proposals

Joint Technical Committee
for
Resource Recovery

TD
794.5
.T47
1973

September 11, 1973.

Preamble

The general background to this project was provided in the paper "Proposal to Establish an Experimental Reclamation Plant", the significant elements of which are recapitulated below.

This proposal was accepted by the Government of Ontario, and in view of its significance, it was decided to set up a representative technical committee to initiate and supervise the project.

The permanent members of this Joint Technical Committee for Resource Recovery consist of:

Wes Williamson, Acting Director,
Waste Management Branch,
Ontario Ministry of the Environment - Chairman

Eric Sanderson, Chief, Solid Waste Division,
Environment Canada.

Ian McKerracher, Director, Refuse Disposal Division,
The Municipality of Metropolitan Toronto.

This permanent committee is authorized to co-opt additional temporary members as required for special purposes.

The Committee is in agreement with the expressed opinion of the Ontario Ministry of the Environment that reclamation, or more accurately reuse, recycling and reclamation, is the best ultimate solution to the mounting problems of municipal waste management.

Summarily, this view is taken because of:

1) The continuing and accelerating rise in per capita production of wastes;

2) The proliferation of types of material discarded as waste;

3) The necessity of preventing environmental contamination resulting from waste disposal;

4) The anticipated exponential increase in cost necessary to achieve this by present methods;

5) The need to conserve resources including energy resources.

However, before reclamation can be established as a viable alternative to present methods of municipal waste disposal, a comprehensive investigation of all of the extremely complex factors involved is essential.

There are six different basic approaches and almost undoubtedly action will have to be taken along all six lines to achieve success.

These approaches are:

1) Reduction in the quantity of material produced which is likely to result in waste;

2) Changes in the types of material used to simplify separation, recycling or reclamation of the waste produced;

3) Separation of waste at source;

4) Central reclamation plants;

5) Processing facilities for separated materials;

6) Encouragement of reuse of reclaimed material and the development of new uses.

With regard to items 4 and 5, the development of central reclamation plants, and processing facilities for separated materials, no facility is now in existence, or to our knowledge proposed, which is sufficiently comprehensive to be capable of providing the information necessary before any municipality could

consider the establishment of a working facility to deal with all of the municipality's wastes as a reliable alternative to present methods of disposal.

A number of proposals have been received from various individuals and companies for specific types of proposed plants, but in all cases these have been designed with a preconceived bias toward particular processes and equipment. It is impossible, with the information presently available, to make any reliable assessment of the value of such proposals in practice.

It appears essential that a facility should be established which is capable of testing in practice the various technologies which are theoretically feasible.

Apart from the above, it is most unlikely that any one type of plant would be capable of serving the widely varying needs of all communities. It also appears essential to obtain detailed information on the characteristics and possible uses of semi-processed material, which would determine the practicability of constructing such plants upon a modular concept which could be established in stages.

It was for these reasons that an experimental reclamation plant was proposed as the first stage in the development of a resource recovery centre.

Procedures

By advertisement in the press, interested consultants were invited to submit details of their qualifications and experience in a number of areas related to the requirements for such a project.

A qualification matrix was set up under ten headings, each of which was allotted a "weighting ratio" which in the view of the Committee represented its significance. These matrix headings are listed below:

1) Curriculum Vitae
2) Pollution Control and Monitoring
3) Environmental Analysis
4) Canadian Facilities and Capabilities
5) Process Control and Instrumentation
6) Management Systems Analysis
7) Materials Handling
8) Segregation and Processing
9) Process and/or Equipment Development
10) Solid Waste Management

Each of the twenty-nine submissions received was then evaluated by the Committee, with the assistance of staff of the Waste Management Branch, and a numerical value ranging from 0 to 100 was allotted to each consultant under each of these headings.

The matrix was completed by multiplying this value by the respective weighting ratio and the sum of the numerical values derived under each of the ten headings gave the consultant's total rating.

The three top rated consultants have been provided with copies of these terms of reference, and invited to discuss them at an interview with members of the Committee, subsequent to which a final selection will be made.

Objectives of Resource Recovery Centre

1) To investigate and compare the suitability of alternative procedures, processes and equipment for the separation and reclamation of components of municipal wastes;
2) To determine the feasibility of separation and reclamation plants as an alternative to present methods of disposal;
3) To examine the feasibility of staged or modular introduction of such plants;
4) To investigate the additional processing required for the marketing of reclaimed materials;
5) To investigate alternative outlets for such materials, and the methods and costs of handling;
6) To develop criteria by which the capital and operating costs of various types of plant of various sizes can be reliably estimated;
7) To develop criteria by which the environmental effects, including the consumption of energy, of reclamation can be gauged so that a reliable and complete comparison can be made between alternative processes;
8) To provide facilities to other agencies and to industries for the installation and testing in practice of equipment, instrumentation and processes related to their particular fields.

Terms of Reference

The consultant shall submit his proposal under three headings:

1) Facilities & Program

A general outline of the facilities to be provided and the program of activities proposed for the achievement of the objectives set out;

2) Experimental Reclamation Plant

Detailed proposals for the establishment of an experimental reclamation plant;

3) Plant Operations

Recommendations for the operation of the plant over a five-year period, in accordance with the research program outlined, including proposals for the additional equipment and processes to be installed during that period.

Facilities and Program

Since this program will provide a long term framework for the development and introduction of innovative waste management facilities, it will be necessary for the consultant not only to assess the existing technology available, but to attempt to forecast the directions of future technological development.

Highly imaginative thinking and an unbiased examination of novel approaches, soundly based on a comprehensive knowledge of waste management, are prerequisites to the development of a viable program.

In particular, the consultant shall;

1) Examine and assess existing technology in use for municipal wastes;
2) Examine and assess existing technologies used in industry with possible applications to municipal waste;
3) Examine and assess existing technology for the processing of separated material for reuse or the recovery of energy;
4) Examine and discuss in general terms possible outlets for separated and if necessary reprocessed material;
5) Examine and discuss the requirements of a long term research program directed to achieve the objectives set out;

6) Consider alternatives and make recommendations for such a program including:

   1) A general outline of the program;

   2) Methodology;

   3) Organization and personnel;

   4) Administration;

   5) Possible participation by other agencies and industry;

   6) Funding.

Experimental Reclamation Plant

While this is conceived as an experimental facility, the basic processes selected for installation in the first instance should provide the most promising approach. Two points should be emphasized in this connection. First, despite the experimental connotation, this should be a working reclamation plant with the capability of recovering substantial quantities of reusable raw material from the incoming waste, and second, it is highly desirable that information derived from the operation of the plant should have the potential for immediate application to the upgrading of municipal waste management facilities so that a staged or modular development of these facilities can be achieved leading to a full scale total process.

The key note of a facility of this type must be complete flexibility, particular in relation to material handling. Material flow through the facility should have the capability of being rerouted so that any individual unit can be bypassed and alternative process flows tested. Similarly, facilities should be provided so that material

can be withdrawn from the stream at any stage of the process for transport to the point of use or for testing.

Special attention must be paid to the instrumentation provided for measuring and recording material flow, product quality, the amount and quality of any effluents or emissions and the factors necessary to determine exact operational costs.

With respect to the location of the plant, its relation to outlets for reclaimed materials is not considered a significant factor, since these are in any event variable and to a large degree at present unknown. It appears desirable to the committee that such a facility should be associated with a major landfill site of a high standard of operation and with facilities for the collection and testing of leachate. Apart from the fact that during experimental runs a large proportion of material must be ultimately disposed of by landfill, the landfill site will provide facilities for testing the use of raw ground material, rough composted or fully composted material as cover, soil conditioner or fertilizer. Use of a major landfill site would also ensure a constant supply of any quantity of waste required at the facility.

The committee appreciates that strong arguments can be put forward for an alternative location at a major transfer station and both possibilities should be examined and discussed by the consultant.

The design capacity, for efficient and reasonably economic operation, has been assessed at a minimum of 100 tons per day and preferably should be 200 tons per day for any equipment that cannot readily or economically be duplicated. The consultant shall discuss and make

recommendations on the design capacity of the plant with these aspects in mind and even more significantly the reliability of scaling up experimental results to possible working plant sizes of 1,000 tons per day or more.

Apart from the handling and storage facilities for incoming waste, which should take into account the possible desirability of presegregation of, for example, bulky wastes, appliances, corrugated, etc. and the necessarily complex in-plant materials handling systems, consideration must be given to the following processes for selection of the basic elements of the experimental plant.

1) Grinding equipment
2) Screening
3) Magnetic separation of ferrous metals.
4) Air classification.
5) Mechanical composting.
6) Ballistic or gravitational separation techniques.
7) Electrostatic separation.
8) Pyrolysis.
9) Use of composting for stabilization of sewage sludge and animal manure.
10) Alternative stabilization techniques for organics.
11) Ballistic or centrifugal separation of glass.
12) Wet process stream for recovery of paper fibre.
13) Flotation or density separation.
14) Methanation of organics.

This list is not, of course, exclusive and the selection of processes for initial installation should take into account possible future extensions to the original plant.

In particular the consultant shall:

1) Examine and discuss the requirements for the initial development of the experimental reclamation plant including:
   1) Location.
   2) Design capacity.
   3) Process units.
   4) Material separated.
   5) Possible uses and outlets.
   6) Possible application of processes in staged development of municipal reclamation plants.
2) Prepare preliminary engineering plans for the facility including:
   1) Process flow sheets.
   2) Layout plans.
   3) Process unit plans and general specifications.
   4) Cost estimates including engineering costs for the preparation of contract documents.
   5) Program schedule and estimated time for construction and start-up.

Plant Operation

The consultant shall examine and discuss the operation of the plant over a five-year period from start-up within the framework of the research program developed. In particular, the consultant shall:

1) Provide recommendations on operating procedures including:
    1) Operating organization and personnel.
    2) Reserach organization and personnel.
    3) Collection, collation and analysis of data.
    4) Relation between experimental plant operation and associated facility (landfill or transfer station) operations.
    5) Application of results.
    6) Annual operation and maintenance costs.
    7) Handling and reuse of separated material and possible income derived.
    8) Co-operation with other agencies and industries.
2) Provide recommendations on additions to process units or installation of units for reprocessing of separated materials including:
    1) Estimated capital cost program.
    2) Estimated additional operating costs.
    3) Additional personnel required.

General

The consultant shall provide monthly interim reports to the committee during the course of the study and 50 copies of a final report on completion.

TD
794.5
.T47
1973